Interventional Pain Management Reports
ISSN 2575-9841 Volume 2, Number 5, pp 189-191

Case Report

High Frequency 10kHz Spinal Cord Stimulation for Failed Neck Surgery Syndrome: A Case Report

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High frequency 10 kHz (HF10 kHz) spinal cord stimulation (SCS) is a specific modality of non-paresthetic SCS which has been proven to be extremely efficient for axial low back pain and combined back and leg pain (1-5). Mid-thoracic lead positioning (between T8 and T10) has been widely described and commonly used for low back pain. HF10 kHz stimulation has been reported as superior to tonic stimulation for patients with low back pain and, specifically, in patient with failed back surgery syndrome (5,6).

Only a few studies (mostly case reports or case series) have investigated HF10 kHz SCS for chronic cervical pain. El Majdoub (7) described a case series of 23 patients with severe chronic cervical pain treated with HF10 kHz SCS and reported a 93.8% success rate at 6 months follow up. Kapural (8) described a successful case report of HF10 kHz SCS for a patient with chronic cervical pain. We describe a case of failed neck surgery syndrome (FNSS) treated with HF10 kHz SCS. We employ the term FNSS to describe patients that have persistent, medically intractable pain of the upper extremities and/or neck despite having had at least 1 prior cervical spine operation for degenerative disease.

CASE REPORT

A 35-years-old patient was evaluated in our pain management center (ASST Franciacorta, Italian National Health Service public hospital) for severe low back and cervical pain. Written consent was obtained from the patient to use his data for research. In the previous 5 years, the patient had received multiple back surgeries for lumbar and cervical protrusions in a severe case of spinal degenerative stenosis. He has also underwent a lumbar L3-S1 fusion and a cervical C5-C7 surgical stabilization procedure .

The patient was complaining of severe back and neck pain with a Numerical Rating Scale (NRS) score of 9 out of 10, and was taking high doses of opioids medication including tapentadol 400 mg daily and sublingual fentanyl 400 mcg, 3 to 4 times daily for breakthrough pain, as well as NSAIDs almost daily (etoricoxib 60 mg).

We decided to treat the patient for his low back pain first , thus we implanted a HF10 kHz SCS with a single catheter positioned midline at T8-10. One month after the SCS positioning procedure, the patient reported good pain relief with a NRS for low back pain of 3 out of 10.

He had reduced his opioid intake to tapentadol 300 mg daily and sublingual fentanyl 400 mcg twice daily, but he still complained for severe neck pain radiating to his upper arms.

We decided to proceed with a cervical SCS catheter placement for the patient. We positioned a HF10 kHz SCS catheter with a C7-T1 entry point, placing the tip midline at C2 level. Intraoperative testing showed good paresthetic coverage on the neck and upper limbs. We performed a 30-day trial in both tonic and HF10 kHz stimulations for 15 days each. At the end of the trial period, the patient reported good pain relief (NRS 2 for cervical pain) in both tonic and HF10 kHz stimulations, with a preference for the non-paresthetic stimulation (SCS programming in HF10kHz modality is shown in Fig. 1). The cervical catheter was then implanted and connected to the IPG previously positioned in the abdominal subcutaneous tissue.

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After 1 month, the patient reported increased cervical pain with a NRS of 5 out of 10. A cervical x-ray was requested and the catheter appeared to be displaced with the tip located at C5 level (Fig. 2). As a result, we modified the stimulation using the lead upper contacts in order to return the catheter tip to the correct location.

At 3 and 6 months follow-up, the patient reported good pain relief with the cervical pain with a NRS of 3. He also reported that his back pain was equally well-controlled with a NRS of 3. Medication intake was significantly reduced, and his use of opioids was halted, and his NSAIDs use was reduced to etoricoxib 60 mg once a week.

DISCUSSION

SCS is an established therapy for the treatment of chronic low back and lower limbs pain Limited evidence exists for stimulation of the cervical region for upper limbs pain and even less for cervical axial pain (9). Due to a smaller distance between electrodes and stimulated tissue, together with the high degree of mobility of the spine in the neck area, sudden unpleasant changes in perceived paresthesia can present as an undesirable side effect of traditional SCS. HF10 kHz stimulation avoids paresthesias and proved to be superior to tonic stimulation for treating low back pain (2).

No evidence exists for using HF 10kHz in patients who have already had cervical spine surgery except for isolated case reports in analyses of mixed patients' populations with chronic cervical pain with or without previous surgery (7,8).

Fig. 1. First Programming using cervical catheter at C2 level.

Even if there is no clear indication of best catheter placement for covering cervical axial pain, case reports suggest the best lead placement is between C2 and C6 vertebral bodies for adequate covering of both neck and upper limbs pain (8,9).

Catheter displacement is a common complication of SCS, particularly in the cervical spine.

HF10 kHz stimulation can be adapted and modified in order to compensate for catheter displacement. We reported good pain coverage of the neck and upper limbs even with the catheter covering both C5 and C6 spinal segments, suggesting that this location could be the anatomical target for cervical HF10 kHz stimulation.

CONCLUSION

Our case report suggests that this stimulation modality is safe and could be effective for treating patients who experience complex pain conditions such as FNSS.

Acknowledgments

Andrea Tinnirello, MD: Collected patient data, reviewed existing literature, prepared the draft and approved the manuscript.

Sandra Barbieri, MD: Collected patient data, reviewed existing literature, reviewed the draft and approved the manuscript.

Manuel Todeschini, MD: Collected patient data, reviewed the draft and approved the manuscript.

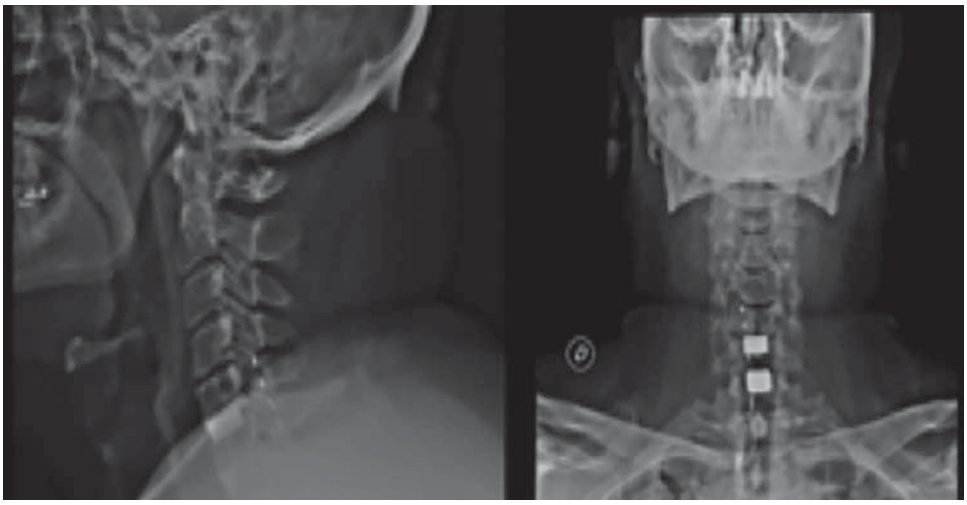

Fig. 2. Cervical x-ray showing catheter displacement at C5 level.

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